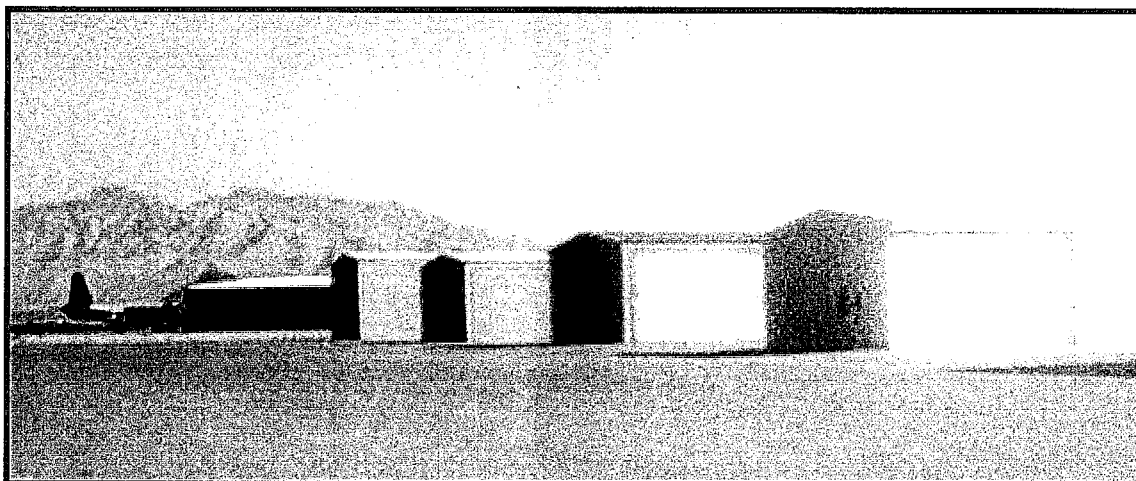




Chapter Four

DEVELOPMENT ALTERNATIVES

DEVELOPMENT ALTERNATIVES



In Chapter Three, airside and landside needs that would satisfy projected demand over the planning period were identified. The next stage in the master planning process is to examine the various ways these facilities can be provided. In this chapter, these facility needs will be applied to a series of airport development alternatives. There are a number of possible alternatives, so some intuitive judgement must be applied to identify those alternatives which have the greatest potential for implementation. The alternative analysis is a critical step in the planning process because it provides the underlying rationale for the final master plan recommendations.

Four basic conceptual alternatives can be considered. The first involves the transfer of projected aviation demand to other regional airports. The second is the development of a new airport site. The third is a "no development" or "do nothing" alternative where the existing airport is left as it is. The fourth alternative involves a development program within the physical and environmental constraints that currently exist. The alternative concepts

presented in this chapter are provided for the purpose of reviewing the relative merits of each, and to assess the impacts of the implementation of each alternative on the existing airport facilities, environs, and surrounding community.

TRANSFER OF AVIATION SERVICES

The alternative of shifting aviation to another existing airport was found undesirable due to several reasons. Currently, Avra Valley Airport is classified as a reliever airport in the National Plan of Integrated Airport Systems (NPIAS), and to transfer the Airport's aviation demand to other area airports runs counter to the objectives of the NPIAS. Secondly, only two other airports in the Regional Aviation System are capable of providing services currently available at Avra Valley Airport: Tucson International Airport and Ryan Airfield. However, both Tucson International Airport and Ryan Field are experiencing their own increased demands for additional

facilities and services. A third airport, Pinal Airpark which is located 8 nautical miles northwest (in Pinal County) of Avra Valley Airport could be considered capable of providing similar or equal services. Although Pinal Airpark is considered a public-use airport, it is currently leased to the main FBO (Evergreen Air Center Inc.) which controls all or most of the airport's facilities and thus limits both local and itinerant general aviation activities. Furthermore, Pinal Airpark's extensive military helicopter training (0700-2300 hours daily) plus its considerable military and civilian parachute training (high and low levels at all hours) would also limit any significant general aviation development or activities at the airpark. Again, as a reliever airport, Avra Valley Airport is an important part of the overall air transportation system for Pima County. Any transfer of Avra Valley Airport's current and future aviation demands would serve only to increase both traffic congestion and aircraft delay at each of the areas other three airports. Therefore, this alternative was found to be an imprudent and undesirable alternative.

CONSTRUCTION OF A NEW AIRPORT

The alternative of developing an entirely new airport to meet the growing aviation needs of northeastern Pima County/northern Tucson Metropolitan Area was also considered. However, like the transfer of services option, this too was found to be a less than favorable alternative, due mainly to economic and environmental considerations. Land acquisition, site preparation and the construction of a new airport facility can prove a very arduous and costly action. In a

situation where public funds are limited, the replacement of a functional airport facility would represent an unjustifiable loss of a significant public investment. From social, political, and environmental perspectives, the commitment of a new large land area must be considered. In the last few years, public sentiment toward new airport construction has been rather negative, due to the public's noise and safety concerns, and, additionally, that new airports normally require the acquisition of several large parcels of privately or publicly-owned land. Furthermore, the development of a new airport comparable to Avra Valley Airport would likely take several years to become a reality. In addition, the potential exists for significant environmental impacts associated with disturbing a large land area when developing a new airport site. Consequently, the construction of a new airport, when the existing Avra Valley Airport can be improved for significantly less cost and within a reasonable time frame, cannot be considered a prudent or feasible alternative.

DO NOTHING ALTERNATIVE

In analyzing and comparing the costs and benefits of the varied development alternatives, it is important to consider the effect of no future development at Avra Valley Airport. The "do nothing" alternative essentially considers keeping the Airport in its current condition and not providing for any type of improvement to the existing facilities. To follow this course, however, would restrict current users from taking full advantage of the Airport's air transportation capabilities as well as limit the Airport's ability to attract new users, especially those businesses seeking a location with adequate and convenient

aviation facilities. Moreover, aviation forecasts and facility requirement analysis for the Airport indicate the need for the extension of both Runway 12-30 and 3-21, a possible future parallel runway, additional taxiways, upgrades to nav aids, airfield lighting, improved general aviation terminal facilities, additional aircraft storage facilities and ramp parking area, improved airport access and auto parking, utility upgrades and improvements, and better airport security. Without these facilities, the Airport's contribution as a vital and productive component of the local economy will be greatly diminished. As such, this alternative was found to be an undesirable alternative.

AIRPORT DEVELOPMENT OBJECTIVES

The previous chapter identified both the airside and landside facilities necessary to satisfy forecast demands through the planning period. The overall objective is to produce a balanced airside and landside complex to serve forecast aviation demands.

The components which constitute the development alternatives for Avra Valley Airport can be categorized into functional areas: the airside (runways and taxiways) and landside (terminal facilities, aircraft storage hangars, and aircraft parking apron). Within each of these functional areas, specific facilities are required or desired. Although the requirements for each of these functional areas is arrived at separately, each relates to the other and affects the development potential of one another. Therefore, these areas must be analyzed both individually and collectively, then integrated into a final plan that is functional, efficient, cost effective and

minimizes environmental impacts. The results of this process is a basic airport concept that produces a realistic development plan.

AIRFIELD SAFETY CONSIDERATIONS

Airfield facilities are, by nature, the focal point of the airport complex. Due to their primary role and the fact that they physically dominate airport land use, airfield facility needs are often the most critical factor in the determination of rational airport development alternatives. Particularly, the runway system requires the greatest commitment of land area and often imparts the biggest influence on the identification and development of other airport alternatives. Additionally, because of the nature of aircraft operations, a number of FAA design requirements must be considered when examining airfield improvements. These requirements can often have a substantial impact on the feasibility of various alternatives designed to meet airfield needs.

FAA design criteria defines the physical attributes of runways, taxiways, as well as the separation of facilities, and the limits of imaginary surfaces, which protect aircraft from objects that could present a hazard to navigation. As previously discussed in Chapter Three, FAA design requirements are most often based upon the approach speed and wingspan of the most demanding aircraft that will operate at the airport. However, these requirements may also be affected by the airport's approach visibility minimums. An examination of these specifications for the design aircraft results in an FAA defined Airport Reference Code (ARC) that governs the elements of design standards for each specific runway. Based upon the data

presented in Chapter Three, the ARC's governing the future runway development at Avra Valley Airport were determined to be ARC C-III for Runway 12-30, and ARC B-II for both the existing Runway 3-21 and any

future parallel runway to Runway 12-30. For reference, both the existing and ultimate airfield design standards covering ARC's B-I, B-II, C-II, and C-III are shown in **Table 4A**.

Table 4A Airfield Design Standards by ARC				
	Existing Runway 3-21	Ult. Runways 3-21 and 12R-30L	Existing Runway 12L-30R	Ultimate Runway 12L-30R
Airport Reference Code	B-I	B-II	C-II	C-III
Approach Visibility Minimums	One Mile	One Mile	One Mile	One-half Mile
<u>Runway</u>				
Width	75'	75'	100'	100'
Runway Safety Area (RSA)				
Width	120'	150'	400'	500'
Length Beyond Runway End	240'	300'	1,000'	1,000'
Object Free Area (OFA)				
Width	400'	500'	800'	800'
Length Beyond Runway End	200'	300'	1,000'	1,000'
Runway Centerline to:				
Parallel Taxiway Centerline	225'	240'	400'	400'
Edge of Aircraft Parking Apron	200'	250'	500'	500'
<u>Runway Protection Zones (RPZ)</u>				
Inner Width	250'	500'	250'	1,000'
Outer Width	450'	700'	450'	1,750'
Length	1,000'	1,000'	1,000'	2,500'
<u>Obstacle Clearance</u>	20:1	20:1	34:1	50:1/34:1
<u>Building Restriction Line (BRL)¹</u>				
Distance from Runway Centerline	370'	495'	745'	745'
<u>Taxiways</u>				
Width	25'	35'	35'	50'
Safety Area Width	49'	79'	79'	118'
Object Free Area Width	89'	131'	131'	186'
Taxiway Centerline to:				
Parallel Taxiway/Taxilane	69'	105'	105'	152'
Fixed or Moveable Object	44.5'	65.5'	65.5'	93'
<u>Taxilanes</u>				
Taxilane Centerline to:				
Parallel Taxilane Centerline	64'	97'	97'	140'
Fixed or Moveable Object	39.5'	57.5'	57.5'	81'
Taxilane Object Free Area Width	79'	115'	115'	162'
Source: FAA Airport Design Software Version 4.2D, F.A.R. Part 77, TERPS				
¹ 35-Foot Building Height				

The FAA has established several imaginary surfaces, areas, and zones to protect aircraft operational areas and keep them free from obstructions which could affect the safe operation of aircraft. These surfaces include the Object Free Area (OFA), Obstacle Free Zone (OFZ), Runway Protection Zone (RPZ), Runway Visibility Zone (RVZ), Federal Aviation Regulations (FAR) Part 77 primary and transitional surfaces, and the Building Restriction Line (BRL).

The OFA is defined as "a two dimensional ground area surrounding runways, taxiways, and taxilanes which is clear of objects except for objects fixed by function." The width of the runway OFA is centered on the runway centerline while the length is fixed by a specified distance beyond each runway end. OFA's extend the length of taxiways and taxilanes are therefore designated by width only. The dimensions for each of these OFA's can vary dependent on the respective ARC for each runway, taxiway or taxilane. Currently, the existing OFA for Runway 12-30 extends off of Airport property approximately 200 feet and crosses Avra Valley Road near the southeast corner of the Airport. As previously defined, this existing OFA does not meet FAA design standards. To satisfy the applicable design requirements involves either realigning Avra Valley Road or displacing Runway 30's threshold the necessary distance to provide adequate OFA clearances.

The OFZ is a defined volume of airspace centered 150 feet above the runway centerline, extending a designated distance on either side of the runway as well as a designated distance beyond each runway end. Like the OFA, the length and width dimensions for the OFZ are dependent on the governing ARC for each individual runway. For Runway 12-30 (ARC C-III) the OFZ measures 200 feet either side of the centerline and 200 feet beyond each

runway end. The ultimate ARC B-II OFZ dimensions for both the existing Runway 3-21 and the proposed parallel runway is 125 feet either side of the centerline and 200 feet beyond each runway end. The OFZ is required to be clear of objects, whose location is not fixed by function, so as to provide clearance protection for aircraft landing or taking off from the runway, and from missed approaches.

The RPZ is a defined area off of each runway end which is designated to enhance the protection of people and property on the ground. The RPZ is trapezoidal in shape and is centered on the extended runway centerline. The RPZ begins 200 feet from each runway end, and it's dimensions are a function of the design aircraft (ARC) and approach visibility minimum for each particular runway. For Runway 12-30 (ARC C-III), the ultimate RPZs are dimensioned as follows: the inner width is 1,000 feet wide, 2,500 feet in length with an outer width of 1,750 feet. The approach visibility minimums for each end are not lower than one-half mile for Runway 12L, and not lower than three-quarter mile for Runway 30R. The ARC B-II RPZ dimensions for both Runway 3-21 and the proposed future parallel runway are 500 feet (inner width) by 1,000 feet (length) by 700 feet (outer width). The approach visibility minimums for each end of these runways are not lower than one mile. It is desirable that the Airport have owner control of the RPZs, and that all RPZ areas be maintained clear of incompatible objects and activities. Such control is preferably exercised through the acquisition of sufficient property interest, through land purchase or avigation easement, for the area encompassed by the RPZ. Presently, only the RPZ for Runway 12L is owned by the Airport, while the remaining RPZs are unregulated. The RPZs for both Runway 3 and Runway 30R currently extend

across Avra Valley Road, and while there is adequate clearance to the Runway 30R approach surface, the road does appear to be an obstruction to the Runway 3 approach surface. Each alternative presented in this chapter recommends that the Airport acquire control over all of the ultimate RPZs through property acquisition where feasible, which may lead to the closing and/or realigning of segments of Avra Valley Road.

The RVZ is required for airports without an air traffic control tower and intersecting runways in order to provide adequate line-of-sight for aircraft between the intersecting runways. The purpose of the RVZ is to reduce the possibility of collisions between aircraft using the intersecting runways. The RVZ clearing standards require this zone to be free of objects that could prevent an adequate view of the intersecting runway. The RVZ is an area formed by imaginary lines connecting the crosswind runways visibility points. These visibility points are generally the midpoint between each runway end and the intersection of the two runway centerlines. A diamond-shaped area is formed by connecting the points. *FAA Advisory Circular 150/5300-13, Airport Design* states "Terrain needs to be graded and permanent objects need to be designed or sighted so that there is an unobstructed line of sight from any point five feet above an intersecting centerline within the runway visibility zone." Currently, portions of the aircraft tie-down area located north of the T-hangars and south of the Runway 12-30 and Runway 3-21 intersection lies within the existing and ultimate RVZ.

The primary surface and transitional surfaces are both components of FAR Part 77, and are intended to protect aircraft operating areas from hazards that could affect the safe and efficient operation of aircraft arriving and departing the airport. The primary surface is a

rectangular surface centered on the runway centerline and extends 200 feet beyond each runway end. The width of the primary surface is the same as the inner width of the runway protection zone. It is recommended that all vegetation that may present an obstruction be cleared from the primary surface. The transitional surface begins at the outside edge of the primary surface and rises at a slope of seven to one. There is no restriction on objects within the transitional area, as long as they do not penetrate the sloping surface. At present, there are no known penetrations of either of these surfaces at Avra Valley Airport.

The Building Restriction Line (BRL) is an imaginary line denoting a 35-foot clearance of the transitional surface. The distance for this line on either side of the runway from the runway centerline is 495 feet for ARC B-II and 745 feet for ARC C-III. Presently, there are no existing structures within these ultimate BRLs at Avra Valley Airport. Future landside facilities will be designed and located accordingly. However, like the RPZs discussed earlier, it is preferred that the Airport have control over these areas encompassed by the BRL, therefore, it is recommended the Airport acquire this control through land purchase or avigation easement.

LANDSIDE CONSIDERATIONS

As noted in Chapter Three, landside facilities are those facilities necessary for the handling of aircraft and passengers on the ground. The primary landside facilities to be accommodated at the Airport include aircraft storage hangars, aircraft parking aprons, and general aviation terminal facilities. The interrelationship of these functions is critical in defining a long range landside layout for the Airport. To an obvious extent, landside uses

need to be grouped with similar uses or compatible uses. Other functions should be separated, or at least have well defined boundaries for reasons of safety, security, and efficient operation. Finally, each landside use must be planned in conjunction with the airfield, as well as ground access that is suitable to function. Runway frontage should be reserved for those uses with a high level of airfield interface, or need for exposure. Other uses with lower levels of aircraft movement, or little need for runway exposure can be planned in more isolated locations. The following briefly describes the landside requirements for Avra Valley Airport.

Enclosed T-Hangars and T-Shade Hangars: The facility requirements analysis conducted in Chapter Three indicated that 320 T-Hangar or T-Shade units may be required to satisfy projected long-term demand. Presently, there are a total of 152 T-Hangar or T-Shade units available at the Airport, which falls short of the current estimated requirement of 163 units of this type. Given that the average length of wait is six months for those wishing to lease hangar space at the Airport, the estimated 163 units may be somewhat conservative. Therefore, each airport alternative allows for future expansion in the proposed T-Hangar areas beyond that which was determined in the facility requirements analysis performed in Chapter Three. Additionally, the existing 28 position T-Shade structure and the two western most T-Hangar facilities (14 units) located directly north of the Tucson Aeroservice Center, Inc. (TAC, Inc.) building restrict large aircraft (ARC C-II) movement in these areas and should be removed or relocated. Provisions for the removal/relocation of these structures, with regard to accounting for their 42 total positions, have been made and are reflected on each of the airport development alternatives.

Conventional Hangar Facilities: As noted in Chapter Three, the principal uses of conventional hangars at general aviation airports are for large aircraft storage, aircraft storage during maintenance, and for Fixed Base Operator (FBO) activities. Also discussed in Chapter Three, was the fact that the number of aircraft stored in conventional hangars at Avra Valley Airport is dependent upon hangar usage activities. It was determined that 20 conventional hangar positions are presently available at the Airport, and that long-term forecast requirements numbered 45 positions. Rather than planning for the actual construction of enough conventional hangars to satisfy the forecasted requirement, each airport alternative provides for the development of individual or corporate lots where such hangars could be placed.

Aircraft Parking Aprons: As stated in the previous chapter, a parking apron should be provided for at least the number of locally-based aircraft that are not stored in hangars, as well as transient aircraft. There are 94 aircraft tie-down spaces for single and twin-engine GA aircraft currently available on the main parking apron, which is located north of the T-Hangar and T-Shade area. This area is not presently divided into local and transient parking positions. TAC, Inc.'s records indicate 11 positions leased to local aircraft owners, while transient use averages 4 aircraft daily. Based on long-term projected forecasts, the facility requirements chapter recommends that 28 local and 12 transient tie-down positions be provided. As noted earlier in this chapter, portions of the existing tie-down area lie within the existing and ultimate RVZ and should be relocated. The proposed tie-down relocation area shown on each alternative exhibit is currently used as a parking ramp for transport-type aircraft. Relocation of the transport parking ramp is addressed in the

following paragraph.

Currently, there is sufficient area to park between 6 and 8 large aircraft on the transport parking ramp located east of the existing GA parking apron. Future facility requirements recommend a transport ramp area capable of accommodating 12 of these transport-type aircraft, the recommended size and location of this transport ramp is reflected on each airport alternative. Additionally, removing/relocating the two most western T-Hangar units as discussed earlier would allow the area they formerly occupied to be converted to an aircraft parking apron capable of supporting ARC C-II type aircraft such as the Gulfstream III.

General Aviation Terminal Facilities:

General aviation terminal facilities serve several functions at an airport. These functions include providing passenger waiting areas, a pilot's lounge and flight planning, restrooms, concessions, administrative and management offices, storage plus various other needs. The area required for these facilities is not necessarily confined to a single building, but also includes the space used by fixed base operators for similar functions and services. At present, there is not a dedicated airport terminal facility at Avra Valley Airport; however, as noted in Chapter One, Tucson Aeroservice Center, Inc.'s (TAC) office and administration building currently serves this function for the airport. Restrooms, passenger waiting area, pilot's room, flight planning, and concessions are just some of the services available in their facility. In mid-1996 TAC began constructing a 7,000 square foot addition to this existing facility, which would bring their total under-roof area to 9,400 square feet. Completion of this facility addition, as well as any other future building construction at Avra Valley Airport, is contingent upon the installation of a fire

protection system which is required by the State Fire Marshall's office. The County is currently involved in the design stages of such a system, the preliminary details of which are discussed later in this chapter in the section concerning airport utility considerations.

The facility requirements analysis in Chapter Three projected long-term terminal building space requirements of 3,900 square feet. While some or all of the terminal functions may continue to be provided by Tucson Aeroservice Center, Inc.'s facilities, each of the airport development alternatives presented in this chapter does provide that a future site be set aside in the event such a dedicated terminal facility be deemed desirable or necessary.

Airport Access and Parking: As noted in Chapter Three, the main access to Avra Valley Airport is Avra Valley Road, which parallels the southern boundary of the airport. Located south of Tucson Aeroservice Center, Inc. is the designated airport entrance road that connects the Airport to Avra Valley Road which further connects to Interstate 10 (I-10), approximately five miles east, as well as Sanders Road which is roughly one-half mile west of the airport. Furthermore, Avra Valley Road provides access to the eastern part of the Town of Marana which is east of I-10. Meanwhile, Sanders Road is oriented north-south, and from its intersection with Avra Valley Road on north to I-10 is approximately five miles. Sandario Road, intersects Avra Valley Road approximately 650 feet east of the airport entrance, and provides southerly access to Avra Valley Airport. Additional airport access is available at the marked, unpaved access road which leads to Marana Skydiving on the west side of the airport as well other uncontrolled access points at various locations bordering airport property. Each of the proposed airport development

alternatives affects the current alignment of Avra Valley Road, and to a lesser extent Sandario Road. Also, shown on each airport development alternative are the proposed Sanders Road and Tangerine Road alignments as shown in the Marana General Plan. Future airport access roads, which are illustrated on the four airport development alternatives, are based upon these proposed alignments. Whether or not these proposed road alignments (Sandario and Tangerine) ever become a reality is a function of local, county, and state government plans and policies as well as future community development trends.

The main parking area for Avra Valley Airport is located directly south of Tucson Aeroservice Center. This paved lot is not divided by function nor well defined in places, and has an estimated capacity of between 80 to 90 vehicles. As discussed in the previous chapter, this lot mostly serves as the general parking area for both the airport and nonaviation customers of the Sky Rider Restaurant. Additionally, employees of some airport businesses may park in this area. Furthermore, in the past, this lot has also been used for event parking, which may or may not have been airport related. Other airport parking is available in various areas around other buildings or inside T-Hangars when aircraft are being flown.

In Chapter Three, the facility requirements analysis estimated that a total of 156 parking spaces totaling 62,400 square feet of area were required to meet long-term demands. However, this forecast was based on terminal area activities only, as defined by design hour passengers and a percentage of based aircraft requiring automobile parking. Other future parking requirements must be based on number of airport employees, planned facilities development, and other airport property uses whether aviation or nonaviation

related (public events, etc.). Several parking areas are provided on each airport development alternative with these respective uses in mind. These parking areas are of a somewhat general nature, and as such allow more flexibility in their future development.

Fuel Storage: As discussed in the facility requirements chapter, Avra Valley Airport's available fuel storage of 24,000 gallons consists of two 12,000 gallon aboveground storage tanks, one for 100LL fuel and the other for Jet-A fuel. The tanks and related dispensing equipment are owned and operated by Tucson Aeroservice Center, Inc. TAC is considering adding an additional 12,000 gallon Jet-A fuel storage tank to it's existing fuel storage system in order to handle increasing corporate aircraft (jet/turbine) demands. However, like the previously discussed facilities build-out, any addition to the existing fuel storage facilities is dependent upon the implementation of the required fire suppression equipment at the Airport. At any airport, fuel storage requirements can vary based upon individual supplies, distributor policies, and market demand, therefore, future fuel storage requirements for Avra Valley Airport will continue to be dependent upon these factors. Consequently, the airport development alternatives will address only the relocation of these existing facilities, should they conflict with any of the FAA designated aircraft operations protected areas discussed earlier in this chapter.

Airport Management Facility: In Chapter Three it was stated that future county plans called for a permanent airport manager to be located in a modular-type building on-site at Avra Valley Airport, whether this becomes a reality is a county policy decision. Therefore, the recommendation is that any potential airport manager's office be temporary in nature and easily movable (trailer), allowing it

to be setup on the future terminal site until, if and when, such terminal facilities construction is begun. Once the terminal building is completed, the airport manager's office space could then be located within the new structure. Sufficient square footage (± 400 square feet) to allow for this office area has been included and is reflected in the future terminal building illustrated on each airport development alternative.

Aircraft Wash Rack: Chapter Three recommends that an aircraft wash rack facility be considered in any future planning. The location of such a facility should be convenient to aircraft storage and maintenance hangars plus the aircraft parking aprons. The proposed site of this future wash rack facility has been incorporated in each development alternative.

Public Utilities: The existence and/or capacity of any particular utility at the Airport is a function of availability and demand. Future utility requirements for the Airport with regard to expansion and new construction should be analyzed as part of the design process of any future Airport development. Therefore, unless otherwise noted, this section will outline only the type and capacity, where applicable, of those utilities currently available at Avra Valley Airport.

- **Water** - The Airport is supplied by two (2) on-airport well sites. Currently, the water pressure of ± 40 pounds per square inch (PSI), and maximum pumping capacity of 35 gallons per minute (GPM) of these wells and their related water distribution system meets the existing demand at Avra Valley Airport. However, the State Fire Marshall's office and the Pima County Department of Transportation has determined that a fire suppression system must be installed at the airport before

proceeding with any further building construction. Presently in the design stage, this fire suppression system will serve both existing and future buildings. Preliminary components of this system will include an 800 GPM well, storage tanks (1.3 million gallons combined), piping, and a 5,000 GPM booster pump station. In conjunction with the fire suppression system, a potable water system consisting of a storage tank (3,000 gallons) and two booster pump stations (40 GPM each) will also be installed. The final location of each of these systems is still under design consideration. Again, these proposed systems will supplement the existing systems and service both existing and future buildings.

- **Sanitary Sewer** - As noted in Chapters 1 and 3, sanitary sewer services are currently provided by ten (10) individual septic systems located throughout the airport. In the course of developing the airport alternatives presented in this chapter, the possibility and feasibility of connecting the Airport to an off-site sewage treatment plant was explored. However, according to Pima County Department of Public Works - Wastewater Management personnel, the nearest treatment facility which is located in Rillito, is too small to handle additional loading, and the existing Marana treatment facility doesn't service the Airport area. Additionally, the County currently has no plans for expanded sewer service in the immediate Airport area. Wastewater Management has recommended that any new facilities requiring sewage disposal be supplied with their own septic systems. However, due to the scope of proposed landside facilities expansion, the development of an on-site package wastewater treatment plant should be considered. Such a facility could service

all or part of the airport and accommodate not only septic waste but also waste from any aircraft wash rack facilities. Therefore, similar to the future water requirements discussed previously, specifications relating to either individual septic systems or a package wastewater treatment facility should be analyzed as a part of the proposed facilities design process with regard to future Airport development.

- **Electric** - Existing electrical service is supplied by Trico Electric Cooperative. The current capacity of this system is 150 KVA, which is provided by three on-site transformers, sufficiently meets existing Airport demand. Again, future requirements relating to expansion and new construction must be assessed as part of the design process of future Airport development.
- **Storm Drainage** - Storm drainage at the airport is provided by a drainage channel and detention basin constructed on the west side of the airport property. Additionally, mid-field storm water is channeled to a run-off ditch that is graded to drain off-site in the direction of the Santa Cruz River. Future storm drainage requirements which will satisfy the demands imposed by future development should be determined in relation to any proposed construction.
- **Natural Gas** - Currently, Southwest Gas supplies natural gas to the Airport. As with the other utilities, future needs should be analyzed as demands grow along with new Airport development.
- **Solid Waste Disposal** - Pickup and disposal of general, non-hazardous solid

waste is presently contracted to BFI, Inc. No recommendations as to improving the existing Airport procedures are being made in this master plan.

- **Hazardous Materials Disposal** - Currently, the main FBO, Tucson Aeroservice Center, Inc. handles petroleum-based wastes and other hazardous materials disposal at the Airport. Future plans should consider the construction of a waste oil repository as well as contingencies for the removal or disposal of other aviation-related hazardous materials. These sponsor-controlled facilities should be located convenient to all airport tenants, however, far enough from Airport water supplies so as to not endanger them with contamination. The design and location of these disposal facilities, other than in a generic nature, is beyond the scope of this master plan document.
- **Other Landside Considerations** - Avra Valley Airport has no scheduled airline flights, and is therefore exempt from Federal Aviation Regulation (FAR) Part 139 on-site aircraft rescue and firefighting (ARFF) equipment requirements. However, Chapter Three recommended improvements to both the existing on-site equipment (initial response truck) as well as trained, qualified, response personnel to meet the needs of the type of aircraft expected to utilize the airport in the future. Like other considerations detailed in this chapter, this is a matter of policy, demand and affordability. Therefore, in the event that commercial service could one day be established at Avra Valley Airport, a future ARFF site has been reserved and is reflected on each Airport Alternative.

AIRPORT DEVELOPMENT ALTERNATIVES

This section examines four separate airport development alternatives. The exhibits provided illustrate both airside and landside development which compliment each other as components of their respective airport development alternative. Airside improvements, which are common to all four airport development alternatives include the following:

- Extend Runway 12-30 by 299 feet from 6,901 feet to 7,200 feet.
- Extend Runway 3-21 by 499 feet from 4,201 feet to 4,700 feet. (Alternative 4 accomplishes this extension by relocating Runway 3-21).
- A proposed parallel runway to Runway 12-30 measuring 4,700 feet long by 75 feet wide.
- The establishment of a one-half mile GPS approach to Runway 12 which includes the required MALSR approach lighting, and precision runway markings.
- The installation of PAPI-2 visual approach aids to Runway 3-21.
- Taxiway lighting and marking for all existing and future taxiways.
- Apron and aircraft parking area lighting.
- Additional supplementary lighted wind indicating devices.
- The eventual establishment of 1-mile GPS approaches to all remaining runway ends.

Furthermore, the NAVAIDS, runway edge lighting, runway/taxiway markings and taxiway lighting for the proposed parallel Runway 12R-30L would be identical to those same items for Runway 3-21. Each alternative arrives at the ultimate airport condition employing different development configurations, which are described in the following paragraphs.

With respect to airside development, the first alternative, **Exhibit 4A, Airport Development Alternative 1**, proposes extending Runway 12-30 and it's parallel Taxiway A by 299 feet to the southeast from the Runway 12 end. Runway 12-30's current 100-foot width meets ARC C-II requirements, while the existing runway pavement strength rating of 12,500 pounds Single-Wheel gear Loading (SWL) should be upgraded to 75,000 pounds Dual-Wheel gear Loading (DWL)pounds. Furthermore, to increase both aircraft safety and enhance traffic flow, two high-speed exit taxiways serving Runway 12-30 are shown on this alternative exhibit. Additionally, the pavement strength for parallel Taxiway A and it's related exit taxiways should also be strengthened to 75,000 pounds DWL at this time.

Airport Alternative 1 also proposes extending Runway 3-21 and it's parallel Taxiway B 500 feet to the southwest from the Runway 3 end. Runway 3-21 is currently 75 feet wide which satisfies ARC B-II specifications. Again, as noted in Chapter Three, while both Runway 3-21's and Taxiway B's current pavement strength of 12,500 SWL is adequate for the short-term planning period, they should eventually be upgraded to 30,000 pounds DWL in order to accommodate the smaller types of corporate aircraft forecast to use the Airport in the future.

As noted in Chapter Three, FAA criteria recommends the consideration of a parallel runway when forecast annual operations exceed 60 percent of an airport's Annual Service Volume (ASV). The operational forecasts for Avra Valley Airport, as presented in the previous chapter, indicate that the forecasts for the long term planning horizon will be 150,000 annual operations or slightly more than 65 percent of the ASV. Based on these projections, long term planning should

include the consideration of a parallel runway to the existing Runway 12-30. This parallel runway should both increase the airport's operational capacity and reduce aircraft delays.

Similar to the previous Master Plan (June 1987), Airport Alternative 1, shows the proposed parallel runway to be located 3,200 feet southwest of the centerline of the existing Runway 12-30, with its southeastern runway end aligned to the existing Runway 12 end. This runway, to be designated Runway 12R-30L, would be designed to ARC B-II specifications with a length of 4,700 feet and a width of 75 feet. Runway 12R-30L would be served by a full-length parallel taxiway, and both the runway and taxiway would be designed to a 30,000 pound DWL pavement strength rating. It should be noted that some existing structures located east of the existing Runway 3 end would lie within the ultimate RVZ required by this runway's construction and, therefore, should be relocated.

Exhibit 4A also depicts approximately 398 acres in land acquisitions necessary for both the proposed landside development, and to give the Airport control of the required area for the ultimate RPZs and BRLs. After the development of the proposed airside facilities, the amount of land available for landside development is ± 293 acres for Airport Development Alternative 1.

Exhibit 4B, Landside Alternative 1A illustrates the landside development specific to Airport Alternative 1. This alternative depicts a reserved general aviation terminal site and auto parking area located just east of the existing aircraft tie-down apron. The existing tie-down area would be removed, due to RVZ conflicts, and replaced by the proposed tie-down area that is shown on what is presently the transport ramp. The future transport-type aircraft ramp would be located

south of the existing transport ramp and would more than double the parking capacity of the existing ramp. Southeast of the terminal site is the aircraft wash rack facility. Bordering the aircraft wash rack site to the southwest is the relocated fuel storage facility. As noted earlier in this chapter, the existing fuel storage area may require relocation due to Runway Visibility Zone (RVZ) conflicts with the proposed parallel runway. The existing T-Hangar area southeast of the proposed terminal facility would be extended and further developed in order to help satisfy long-term T-Hangar requirements. This development would include existing ramp extension, 8 T-Hangar structures (± 96 units), reserve space for future additional T-hangar structures, an access road and auto parking. Bordering the T-hangar development on the southeast would be six (6) aviation-related development parcels (± 25 total acres) having both ground and taxilane access. Furthermore, the two T-Hangar structures directly north of TAC, Inc. would be removed/relocated and replaced by a large aircraft (ARC C-II) parking area. Again, the number of units displaced due to removal are accounted for in the proposed future T-Hangar developments discussed in this section. Near the center of the "Operators Designated Area", a large hangar development lot is proposed next to an existing conventional hangar known as Hangar "D". Directly south of Hangar "D" is a proposed general parking area which could handle overflow, employee, and/or event type parking. Additionally, Landside Alternative 1A proposes that the area south of both the airport parking area and Avra Valley Road would be reserved for future T-Hangar (± 126 units), aircraft parking ramp, auto parking, and FBO site development. This future development would be adjacent to the proposed parallel runway. These areas, including the proposed terminal site, would be served by a future access road connecting either to the proposed Tangerine Road

alignment or a realigned Avra Valley Road.

Operators on the west side of the Airport who would lose their current ground access due to both the extension of Runway 3-21 and the proposed parallel runway could be served by an access road which would connect them to Sanders Road to the west. This proposed access road is depicted on Airport Development Alternative 1.

The combined airside and landside cost associated with this alternative is estimated at approximately \$25.7 million. A breakdown of specific airside and landside development costs for each alternative are provided in **Table 4B** (found on page 4-20).

Advantages: The main advantages of Airport Development Alternative 1 and Landside Alternative 1A are that they propose future development in close proximity to the currently developed area of the Airport. Although they would require a significant amount of land (± 398 acres) to be purchased, mostly for RPZ and BRL control, these alternatives keep the majority of airport activity in a more centralized location.

Disadvantages: Businesses currently located on the west side of the Airport (west of Runway 3-21) would lose their current ground access due to the extension of Runway 3-21 and the construction of a new parallel runway and, therefore, would require a new access road be built off of Sanders Road. Additionally, though not unique to these alternatives, these options would require the closing or realignment of considerable sections of both Avra Valley and Sandario Roads.

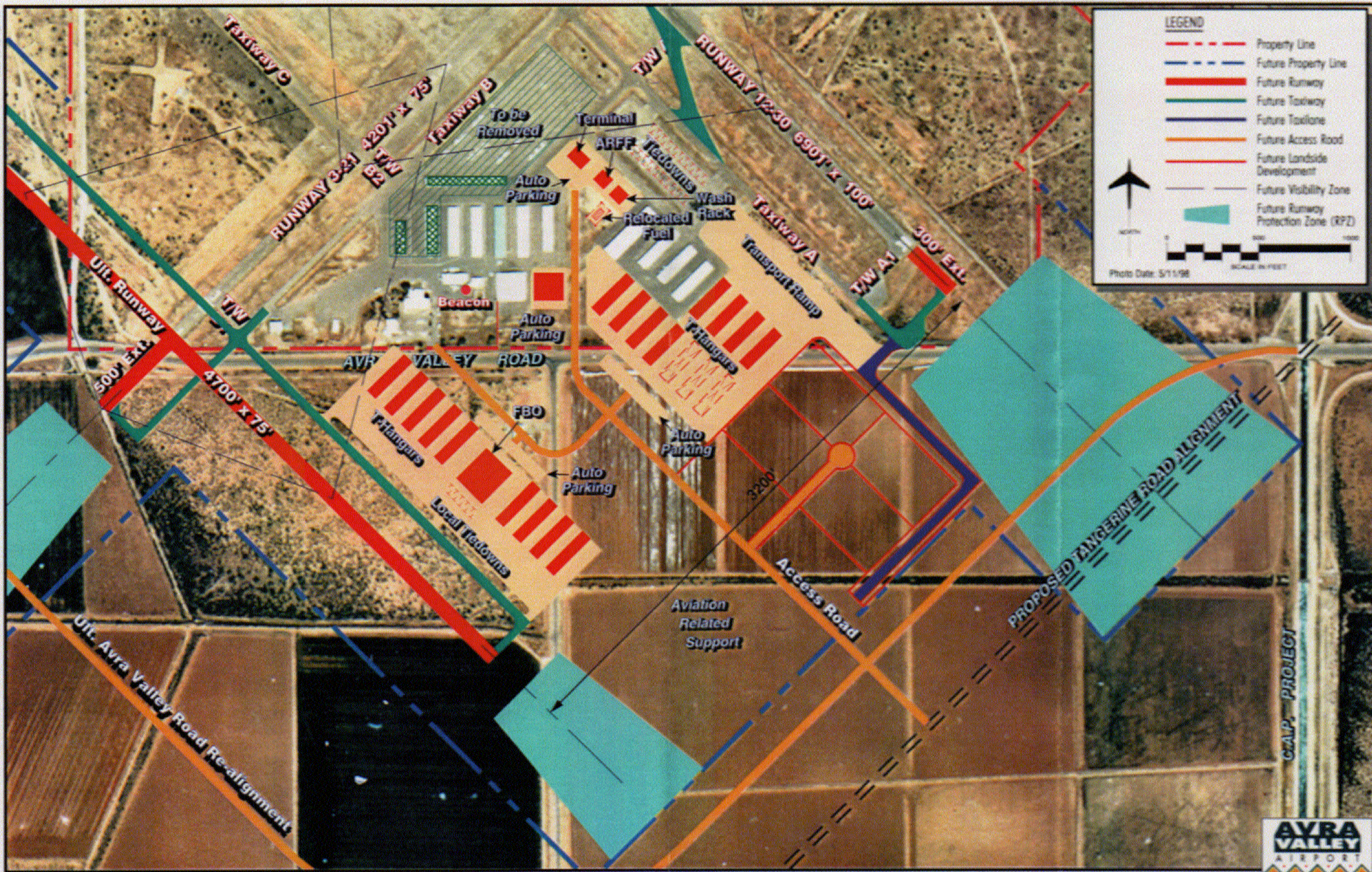
Like the first airport alternative, **Exhibit 4C, Airport Development Alternative 2,**

proposes extending Runway 12-30 299 feet to the southeast at the Runway 12 end to achieve the final runway length of 7,200 feet. The recommendations for taxiway extension, high-speed exit taxiways, and pavement strengthening of both the runway and taxiways described for Alternative 1 also apply to this alternative, as do the proposed improvements to Runway 3-21.

For Alternative 2, the centerline-to-centerline distance between Runway 12-30 and the proposed parallel runway remains at 3,200 feet; however, the southeastern end of the new runway is offset 1,500 feet northwest of the existing Runway 12 end. This runway would be designed to ARC B-II specifications of 4,700 feet in length by 75 feet in width, and would be served by a full-length parallel taxiway. Like Alternative 1, both the runway and taxiway would be designed to a 30,000 pound DWL pavement strength rating. As with the previous alternative, some existing structures located east of the existing Runway 3 end would lie within the ultimate RVZ required by this runway's construction and, therefore, may require relocation.

Airport Development Alternative 2 shows land acquisition requirements totaling approximately 430 acres, again, a large portion of these acquisitions are necessary to give the Airport control of the required area for the ultimate RPZs and BRLs. Minus the acreage required for the proposed airside facilities, the amount of land available for landside development is ± 320 acres for Airport Development Alternative 2.

Landside development for Airport Development Alternative 2 is shown on **Exhibit 4D, Landside Alternative 2A.** This landside alternative takes a different approach in that it proposes the majority of the future



aviation-related and commercial/industrial development take place on the west side of the Airport. However, Alternative 2A is similar to the previous landside alternative as it does reserve the same general aviation terminal site/auto parking area, wash rack, and tie-down ramp as Alternative 1A. Like Alternative 1A, the existing tie-down area would be removed, due to RVZ conflicts, and be replaced by the proposed tie-down area depicted on the existing transport ramp. The future transport parking ramp would, in fact, be two transport parking areas, one located northeast, and the other southeast of the proposed T-Hangar extension area. The existing T-Hangar ramp would be extended approximately 1,050 feet to the southeast to accommodate four proposed T-Hangars (± 48 units), and the southeastern transport ramp.

The other transport parking area would be located to the northeast of the proposed T-Hangars. As with Alternative 1A, the two T-Hangar structures directly north of TAC, Inc. would be removed/relocated and replaced by a large aircraft (ARC C-II) parking area. Again, the number of T-Hangar units displaced due to this removal have been accounted for in this alternative. The existing fuel storage facility can remain where it is, as it is not within the future RVZ of the proposed parallel runway. However, other structures within the ultimate RVZ would need to be removed or relocated. Other proposed facilities this alternative shares with Landside Alternative 1A include: the large hangar development lot next to Hangar "D", and the general parking area south of the same area. As with Alternative 1A, these areas plus the proposed terminal site, would be served by a future access road connecting either to the proposed Tangerine Road alignment or a realigned Avra Valley Road. Additionally, land on both sides of this access road could be reserved for future commercial/industrial

development or aviation-related expansion.

Furthermore, Landside Alternative 2A shows considerable development on the Airport's west side. This alternative proposes T-Hangar (± 190 units), aircraft parking ramp, auto parking, and FBO site development adjacent to the proposed parallel runway's northwest end. Also shown is an airpark-type development totaling approximately 130 acres. This airpark would have both ground and taxiway/taxilane access, and incorporate existing airport property and businesses as well as future property acquisitions. Ground access to the airpark would be from Sanders Road.

The total airside and landside cost associated with this alternative is estimated at approximately \$27.0 million.

Advantages: Together, Airport Development Alternative 2 and Landside Development 2A opens the Airport up to more airpark type development. In effect, they separate the existing general aviation side of the Airport from the more industrial/commercial business-oriented side. However, Alternatives 2 and 2A, in no way abandons the currently developed sections of the Airport, as it still leaves room and flexibility for development to continue in the existing main FBO area. Generally, they allow for much more growth potential and flexibility with regard to future overall Airport development. Additionally, those existing businesses on the west side of the Airport which may feel somewhat isolated or left out in Alternatives 1 and 1A development would be much more visible and accessible under these alternatives.

Disadvantages: Of the four airport development alternatives presented, Alternative 2 along with Alternative 2A require the most property acquisition (± 430 acres). This greater emphasis on land

development designed to attract more businesses would require a larger investment in both existing and new infrastructure improvements. Like the first airport development alternative, this alternative would also require the closing or realignment of considerable sections of both Avra Valley and Sandario Roads.

Exhibit 4E, Airport Development Alternative 3, like the two previous airport development alternatives, proposes ultimate runway lengths of 7,200 feet for Runway 12-30 and 4,700 feet for Runway 3-21. However, it varies from Alternatives 1 and 2 in that it proposes the extensions be constructed at the opposite runway ends of those shown in the previous development alternatives. This means that the 299-foot extension to Runway 12-30 would be accomplished at the northwest or Runway 30 end. For Runway 3-21, the 500-foot extension would take place at the northeast end (Runway 21) instead of the southwest end (Runway 3). Again, all improvements concerning taxiway extensions, new high-speed exit taxiways, and pavement strengthening which were detailed in Alternatives 1 and 2 would still apply to both Runway 12-30 and Runway 3-21 in this alternative as well.

For Alternative 3, the location of the recommended parallel runway differs in that it is northeast of the existing Runway 12-30. The proposed centerline-to-centerline separation distance of 700 feet between these two runways meets ARC C-II requirements. The southeast runway end (Runway 30R) would be aligned with the existing Runway 30 end, and be connected to the other by a runway end taxiway. Like before, this new runway would be served by a full-length parallel taxiway having a minimum total of four exit taxiways. Since this runway is located on the opposite side of Runway 12-30, as compared with those in the previous

alternatives, it would be designated Runway 12R-30L. Again, however, Runway 12R-30L would be designed to ARC B-II criteria of 4,700 feet in length by 75 feet in width. As before, both the runway and taxiway would be designed to a 30,000 pound DWL pavement strength rating.

The calculated area of land acquisition required by Alternative 3 for Airport control of the required ultimate RPZ and BRL areas totals approximately 228 acres. Following the development of the proposed airside facilities, the amount of landside development acreage available is ± 215 acres for Airport Development Alternative 3.

Exhibit 4F, Landside Alternative 3A, proposes the same GA terminal/auto parking facilities, tie-down area, aircraft wash rack, large hangar lot, and general parking area for the existing main FBO area as was shown on the first two landside alternatives. No expansion of the existing T-Hangar development which parallels Taxiway A is proposed for this alternative. However, this alternative does reflect a future parking area for the above-mentioned T-Hangar area. Like the two previous alternatives, the two T-Hangar structures directly north of TAC, Inc. would be removed/relocated and replaced by a large aircraft (ARC C-II) parking area. Again, the number of T-Hangar units displaced due to this removal have been accounted for in this alternative. The future transport ramp would be constructed adjacent to the existing T-Hangar ramp and parallel to the proposed Taxiway A extension. Again, like Landside Alternatives 1A and 2A, these areas would be served by a future access road connecting either to the proposed Tangerine Road alignment or a realigned Avra Valley Road. No future property acquisitions, other than for RPZ and BRL control, are proposed south of Avra Valley Road.

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Landside Alternative 3A illustrates additional development northeast of the proposed parallel runway. Aligned to the proposed runway and related taxiway system is the T-Hangar (± 250 units plus expansion capability), aircraft parking ramp, auto parking, and FBO development site. Further development shown southeast of this area includes corporate or airpark lot development with both ground and taxilane access. The total area reserved for future lot development is approximately 26 acres. Also, shown is a proposed access road which connects this area to Avra Valley Road.

Furthermore, existing airport businesses on the Airport's western edge would lose their existing ground access requiring that a new access road be constructed which would connect them to Sanders Road.

The total costs, both airside and landside, associated with this alternative is estimated at approximately \$21.7 million.

Advantages: Airport Development Alternatives 3 and 3A require the least amount of property acquisition (± 228 acres) of any of the alternatives presented in this chapter. Similar to Airport Development Alternatives 1 and 1A, they keep future development closer to the existing Airport development by proposing development of an area which was designated as a "Future Lease Area" in the previously approved Master Plan (1987) and Master Plan Updates (1991, 1994 and 1997). Furthermore, its impacts to Avra Valley Road, and particularly Sandario Road are considerably less than the two previous airport development alternatives.

Disadvantages: While Alternatives 3 and 3A require less property acquisition, they also offer less in the way of flexibility regarding future Airport development. The proposed

landside development area is bounded by the Central Arizona Project (CAP) Aqueduct on the east, the Santa Cruz River 100-year Floodplain and riparian areas to the north, and the existing and proposed Airport runways to the south. Any proposed development to the north and east may require a Section 404 (Clean Water Act) permit prior to any new construction. Additionally, it separates the existing T-hangar development from the future development areas across two parallel runways and two parallel taxiways. These alternatives, when compared to the previous alternatives, offer little in terms of development of the existing main FBO area, and virtually ignores the west side of the Airport. Furthermore, the entrance to this proposed development area, with its close proximity to the CAP Aqueduct, may require the construction of a much larger bridge, than currently exists, where Avra Valley Road crosses the CAP aqueduct.

Exhibit 4G, Airport Development Alternative 4, differs significantly from the previous alternatives with respect to proposed airside development. As with each alternative, Alternative 4 proposes an ultimate runway length of 7,200 feet for Runway 12-30. This is accomplished by extending the Runway 12 end 299 feet to the northwest. Additionally, this alternative proposes displacing Runway 30's threshold 620 feet to the northwest which would eliminate the need to close or realign those portions of Avra Valley Road currently within Runway 12-30's object free area (OFA) and runway safety area. The recommendations for taxiway extension, high-speed exit taxiways, and pavement strengthening of both the runway and taxiways described for Airport Alternatives 1, 2 and 3 also apply to this alternative.

Furthermore, Alternative 4 proposes closing the existing crosswind Runway 3-21 and

relocating it 2,630 feet northwest of its present position. The Runway 3 end would be located approximately 1,825 feet east and 2,500 feet north of the intersection of Sanders Road and Avra Valley Road. The overall dimensions for this new ARC B-II runway would be 4,700 feet (length) by 75 feet (width). Like the existing runway it replaces, this proposed runway would be served by a 35-foot wide, full-length, parallel taxiway. Both the proposed Runway 3-21 and its related parallel taxiway would be paved to 30,000 DWL.

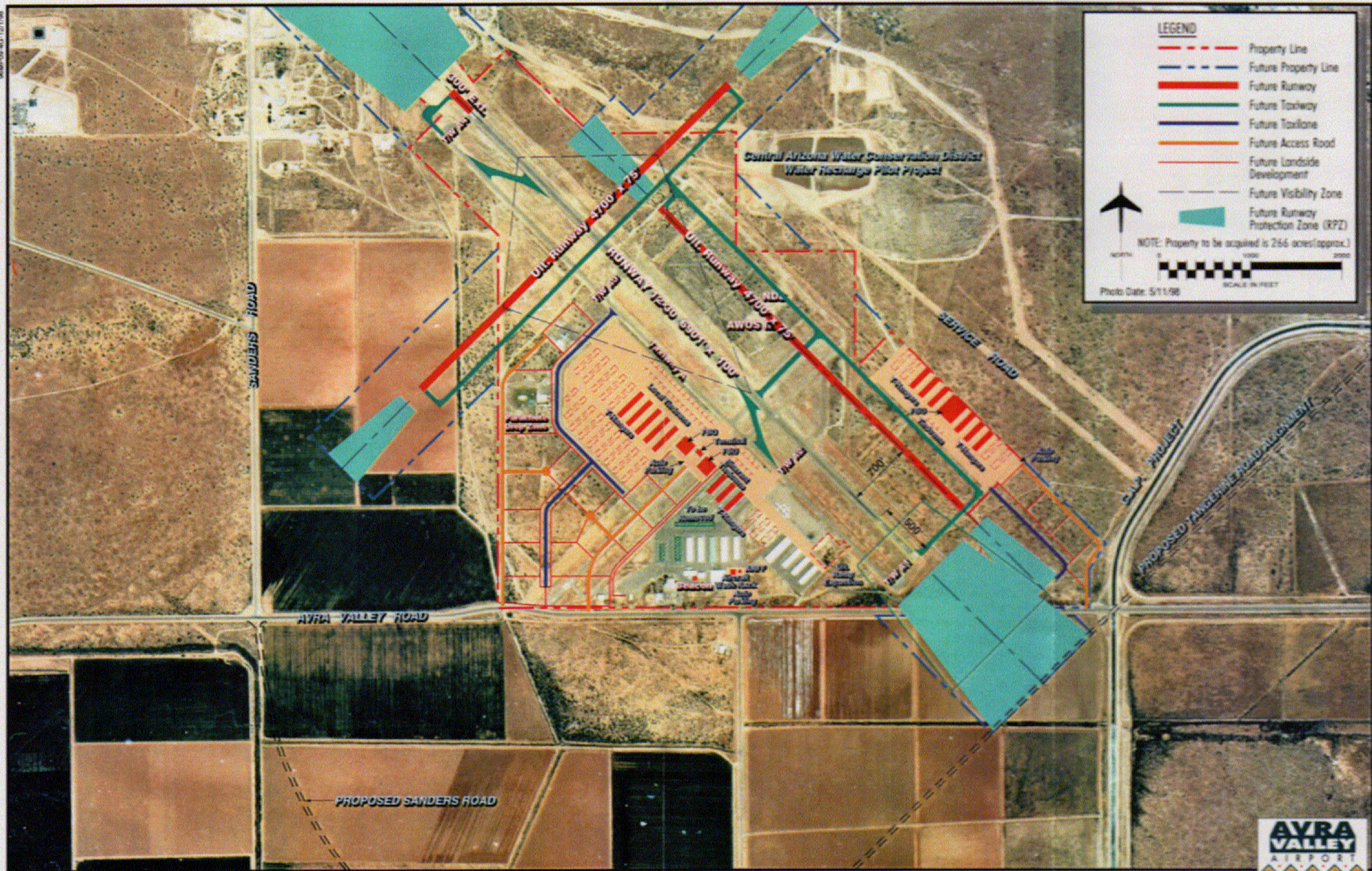
Similar to Alternative 3, Alternative 4 proposes locating the future parallel runway northeast of the existing Runway 12-30. Again, ARC C-II requires a 700-foot centerline-to-centerline separation distance between these two runways. The proposed Runway 30R end would be aligned with the existing Runway 30 end, and be connected to the other by a runway end taxiway. As with the previous alternatives, this new runway would be served by a full-length parallel taxiway having a minimum total of four exit taxiways. Due to its location, this runway would be designated Runway 12L-30R, and be designed to ARC B-II criteria of 4,700 feet in length by 75 feet in width. Once again, both the runway and taxiway would be paved to a 30,000 pound DWL pavement strength rating.

Additionally, **Exhibit 4G** depicts approximately 266 acres in land acquisitions required for both proposed landside development, and Airport control of the required area for the ultimate RPZs and BRLs. After the development of the proposed airside facilities, the amount of land available for landside development is ± 233 acres for Airport Alternative 4.

Landside development for Airport Development Alternative 4 is illustrated on

Exhibit 4H, Landside Alternative 4A. This alternative proposes the majority of development take place on existing airport property. With the closing/relocation of Runway 3-21, landside facility development would be centered around the proposed general aviation (GA) terminal facility which is to be located approximately 835 feet southwest of the intersection of existing Runways 3-21 and 12-30. Flanking each side of the proposed GA terminal facility would be an area reserved for a future FBO facility. These facilities would be adjacent to the proposed aircraft parking ramp which parallels the existing parallel Taxiway A. This proposed ramp, totaling approximately 135,000 square yards, would accommodate local/itinerant GA aircraft parking (tie-downs), transport-type aircraft parking, as well as corporate aircraft (jet and turbine) parking. Bordering the terminal and FBO sites to the southwest would be an auto parking area, with a capacity of approximately 180 vehicles, which would connect to Avra Valley Road via the proposed access road depicted on the exhibit. Additional development northwest of the terminal area reflects T-Hangar development (± 290 units) with both ramp and taxiway access. West and south of this T-Hangar area are areas reserved for corporate parcel or airpark development. These areas incorporate some existing developed lots and would have both airside (taxilane/ramp), and ground access to Avra Valley Road. In the existing T-Hangar area southeast of the proposed terminal facilities are shown six proposed T-Hangar structures totaling approximately 60 units. South and slightly west of the T-Hangars is the reserved aircraft wash rack and future ARFF sites. On the existing ramp, those structures labeled as "To Be Removed/Relocated" could be replaced with large aircraft parking areas. Also shown is an "Edge of Pavement" line depicting the limits of the ultimate ramp area near what is

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now Taxiway B.

Similar to Landside Alternative 3A, Alternative 4A proposes subsequent development northeast of the proposed parallel runway. Aligned to the proposed runway and related taxiway system is the T-Hangar (± 100 units), aircraft parking ramp, auto parking, and FBO development site. Shown southeast of this area is a corporate or airpark lot development site with both ground and taxilane access. The total area reserved for future lot development is approximately 19 acres. Also, shown is a proposed access road which connects this area to Avra Valley Road.

The total airside and landside development cost for this alternative is estimated at approximately \$25.5 million.

Advantages: Airport Development Alternative 4 and Landside Alternative 4A proposes a centrally located, well balanced future development plan. This alternative is second only to Alternative 3 with regard to least amount of property acquisition required (± 266 acres). Furthermore, there are no impacts to Sandario Road while impacts to Avra Valley Road are substantially less than the previous three development alternatives. Although this alternative is similar to Airport Development Alternative 3 in the landside areas it proposes to develop, Alternative 4 offers more development flexibility due to the large area opened up for development by the relocation of Runway 3-21.

Disadvantages: Alternative 4 would be more costly than the other three alternatives mainly due to the closing and relocation of Runway 3-21. Airport capacity and operational delays could also result should the Airport be forced to operate with only one runway (Runway 12-30) during the time it would take to relocate Runway 3-21. Additionally, as with Alternative 3, any proposed development to the north and east may require a Section 404

(Clean Water Act) permit prior to any new construction. Once more, like the previous alternative, the entrance to this proposed development area is in close proximity to the CAP Aqueduct, and may require the construction of a much larger bridge, than presently exists, where Avra Valley Road crosses the CAP aqueduct.

ALTERNATIVE DEVELOPMENT COSTS

Table 4B compares "order of magnitude" development costs for the four airport development alternatives. They reflect general cost estimates for airside and landside development and should be used for comparison purposes only. These estimates do not reflect engineering or contingency costs. Once a development alternative has been decided upon, these estimates will be further refined in the Financial Plans chapter later on in the Master Plan.

SUMMARY

A preliminary master plan concept will be developed after the alternatives are reviewed by the Planning Advisory Committee and Pima County. Once the preliminary master plan concept has been identified, detailed cost estimates will be prepared for the individual projects, a development schedule will be outlined, and potential funding sources for recommended projects will be identified (including those projects that are eligible for federal or state funding assistance). The remaining chapters of the master plan will be used to refine a final concept through the development of detailed layouts and a phased development program. An environmental review of the proposed development will also be conducted to identify any potential environmental concerns related to future airport development.

TABLE 4B**Alternative Cost Comparison Summary - Avra Valley Airport**

Development Item	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Extend Runway 12-30	\$166,100	\$166,100	\$166,100	\$166,100
Strengthen Runway 12-30	\$383,390	\$383,390	\$383,390	\$383,390
Extend Taxiway A	\$144,450	\$144,450	\$144,450	\$144,450
Strengthen Taxiway A	\$168,605	\$168,605	\$168,605	\$168,605
Construct High Speed Taxiways	\$406,250	\$406,250	\$406,250	\$406,250
Extend Runway 3-21 (See note at end of table)	\$208,350	\$208,350	\$208,350	\$1,958,350 ¹
Strengthen Runway 3-21	\$175,000	\$175,000	\$175,000	N/A
Extend Taxiway B (See note at end of table)	\$220,300	\$220,300	\$136,100	\$1,100,550 ¹
Strengthen Taxiway B	\$86,470	\$86,470	\$86,470	N/A
Strengthen Taxiway C	\$61,820	\$56,265	\$61,820	\$57,780
Construct Parallel Runway to Runway 12-30	\$1,958,350	\$1,958,350	\$1,958,350	\$1,958,350
Construct Parallel Taxiway	\$1,024,700	\$1,024,700	\$1,024,700	\$1,024,700
Install MALSR - Rwy. 12	\$350,000	\$350,000	\$350,000	\$350,000
Install PAPI-2 - Rwy. 3-21	\$80,000	\$80,000	\$80,000	\$80,000
Install MITL - Taxiway B	\$432,000	\$432,000	\$432,000	\$432,000
Install MITL - Taxiway C	\$333,840	\$303,840	\$333,840	\$333,840
Land Acquisition	\$3,980,000	\$4,300,000	\$2,300,000	\$2,660,000
Acquire Right-Of-Way for Avra Valley Road Realignment	\$207,000	172,000	\$172,000	N/A
Realign Avra Valley Road	\$1,069,675	\$879,325	\$826,450	N/A
SUBTOTAL (AIRSIDE)	\$11,456,300	\$11,515,395	\$9,413,875	\$11,224,365
Construct T-Hangars	\$6,507,000	\$6,507,000	\$6,507,000	\$6,507,000
Pave T-Hangar Taxilanes	\$1,284,350	\$1,182,225	\$1,306,675	\$1,106,350
Expand/Construct Aircraft Parking Ramp	\$1,704,875	\$2,314,000	\$729,175	\$2,065,075
Install Aircraft Tiedowns	\$24,000	\$24,000	\$24,000	\$24,000
Construct General Aviation Terminal Building	\$585,000	\$585,000	\$585,000	\$585,000
Auto Parking	\$62,225	\$62,225	\$62,225	\$62,225
Access Roads - Improvements and Construction	\$500,000	\$970,825	\$516,675	\$508,325
Aircraft Wash Rack Facility	\$50,000	\$50,000	\$50,000	\$50,000
Utility Improvements	\$3,510,000	\$3,825,000	\$2,535,000	\$3,375,000
SUBTOTAL (LANDSIDE)	\$14,227,450	\$15,520,275	\$12,315,750	\$14,282,975
COMBINED TOTAL (AIRSIDE and LANDSIDE)	\$25,683,750	\$27,035,670	\$21,729,625	\$25,507,340
¹ Alternative 4 proposes relocating Runway 3-21 and Taxiway B, which is reflected in the costs shown for Alternative 4.				